European Lakes Under Environmental Stressors

(Supporting lake governance to mitigate the impact of climate change)

EULAKES model as support for decision making

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Outline

The idea

- Model development

The structure of the Web portal

- Overview of the outputs
- Search Engine
- WebGIS
- OGC services
- Prediction models

http://www.eulakes-model.eu/

The welcome page

Home | Overview of the Outputs | Search engine | webGIS | OGC Services | Prediction models | EuLakes Project

EuLakes model

EuLakes Model

The EuLakes model represents a new **integrated approach to investigate, map and compare vulnerability of big lakes**.

The outputs of the projects are here collected, managed, shared and interpreted to be easily reachable and understood by lakes' stakeholders and decision makers in a rapid and efficient way **to support the environmentally educated decision making**.

The outputs are explained for their importance and use to the lakes's stakeholders, and a specifically built **geographical interface** allows the viewer to easily localize the data concerning his/her specific area of interest.

The Lakes

Garda, **Balaton**, **Neusiedl** and **Charzykowskie** lakes have different geographical and morphological features, different trophic status and human exploitation. However, the four lakes have **primary socio-economic importance** within their respective regions, due to the multiple use of their waters (i.e. irrigation, drinking, tourism, etc.) and surrounding areas.

For this reason they were considered for the EULAKES project, in order **to assess the role of climate change on lakes ecosystems and evaluate the various threats** menacing the future use of these important freshwater resources.

Garda | Neusiedl | Balaton | Charzykowskie

Home
Overview of the Outputs
Search engine
webGIS
OGC Services
Prediction models
EuLakes Project

Search for:

http://www.eulakes-model.eu/

Overview of the Outputs

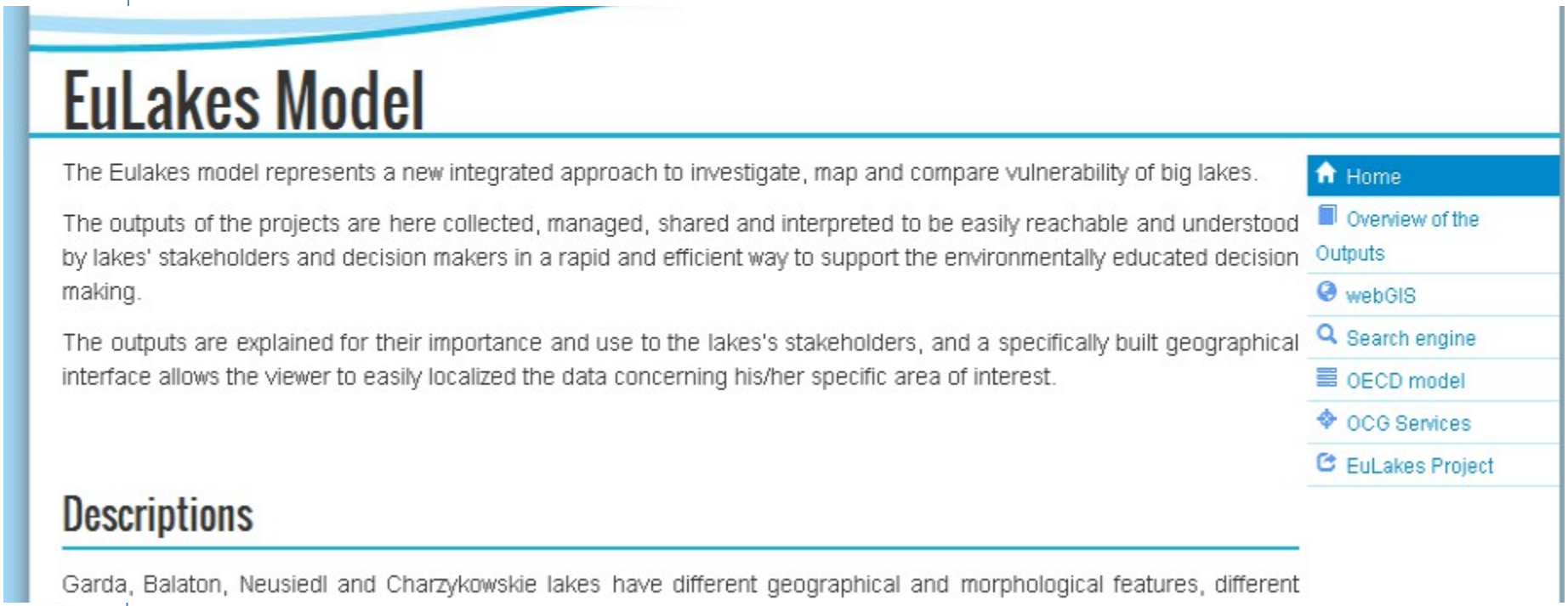
Search Engine
Full text search

webGIS
Geographically referenced outputs

OGC Services
Open Geospatial Consortium standards

Prediction models

Structure



Search engine | webGIS | Overview of the outputs

Outputs

Overview of the outputs

Past

These researches are useful to reconstruct the secular evalution of the ecological status of the lakes, defining therefore baselines (the lake status bifore antropological impact) and to establish restoration objectives to reach.

- Ecological evolution: lake sediment studies
- Colonisation History by Harmful Algae
- Water quality time series studies (2004-2010)

Present

Innovative researches carried out within the Eulakes projects to improve our current understanding of the state of the lake.

- Existing monitoring systems
- Shorezone Functionality Index

Future

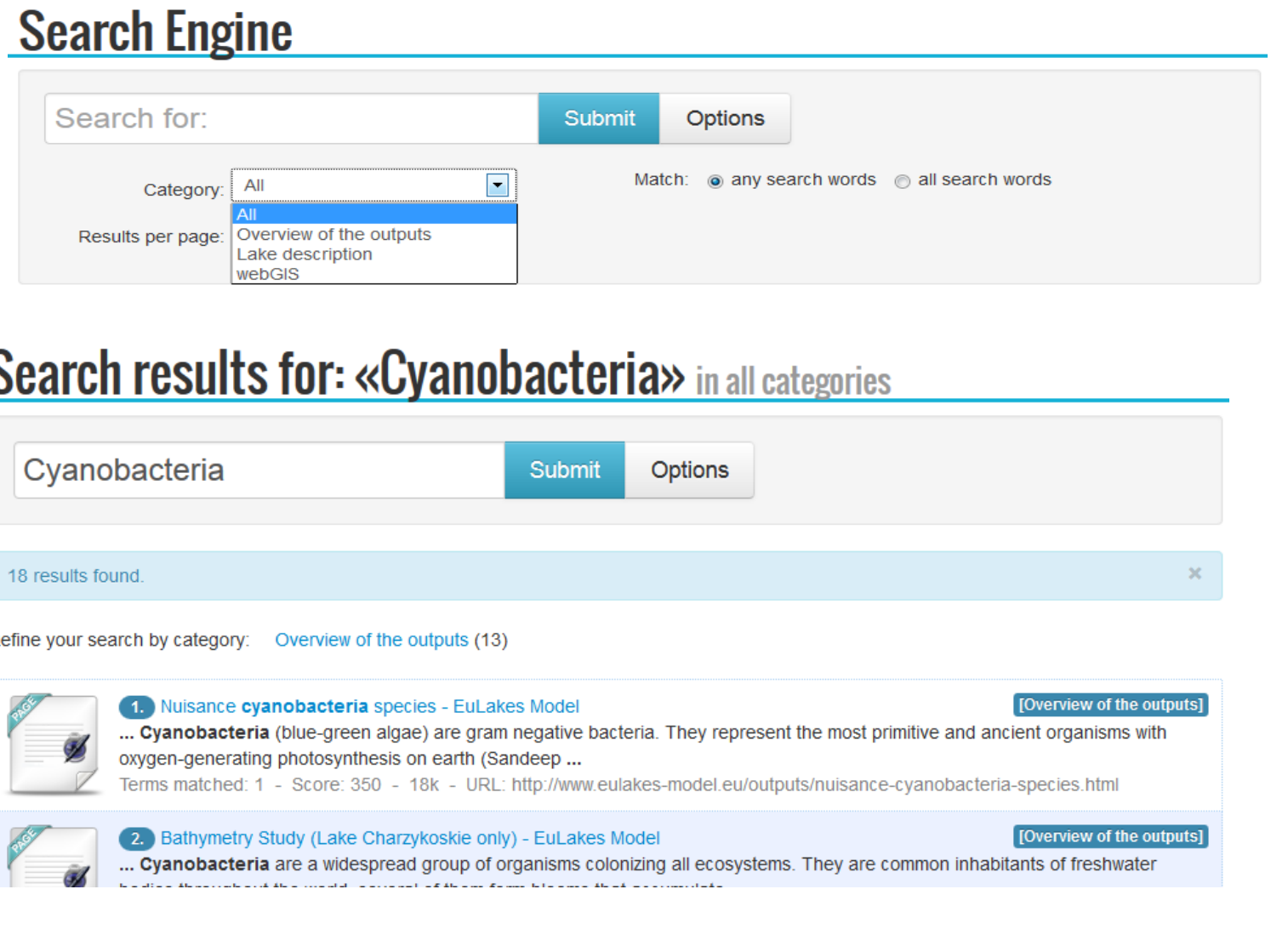
Climatic models have been created to describe the probable variation in temperature, precipitation, wave heats, extreme events and other climate factors from present to year 2100.

- Lakes Vulnerability

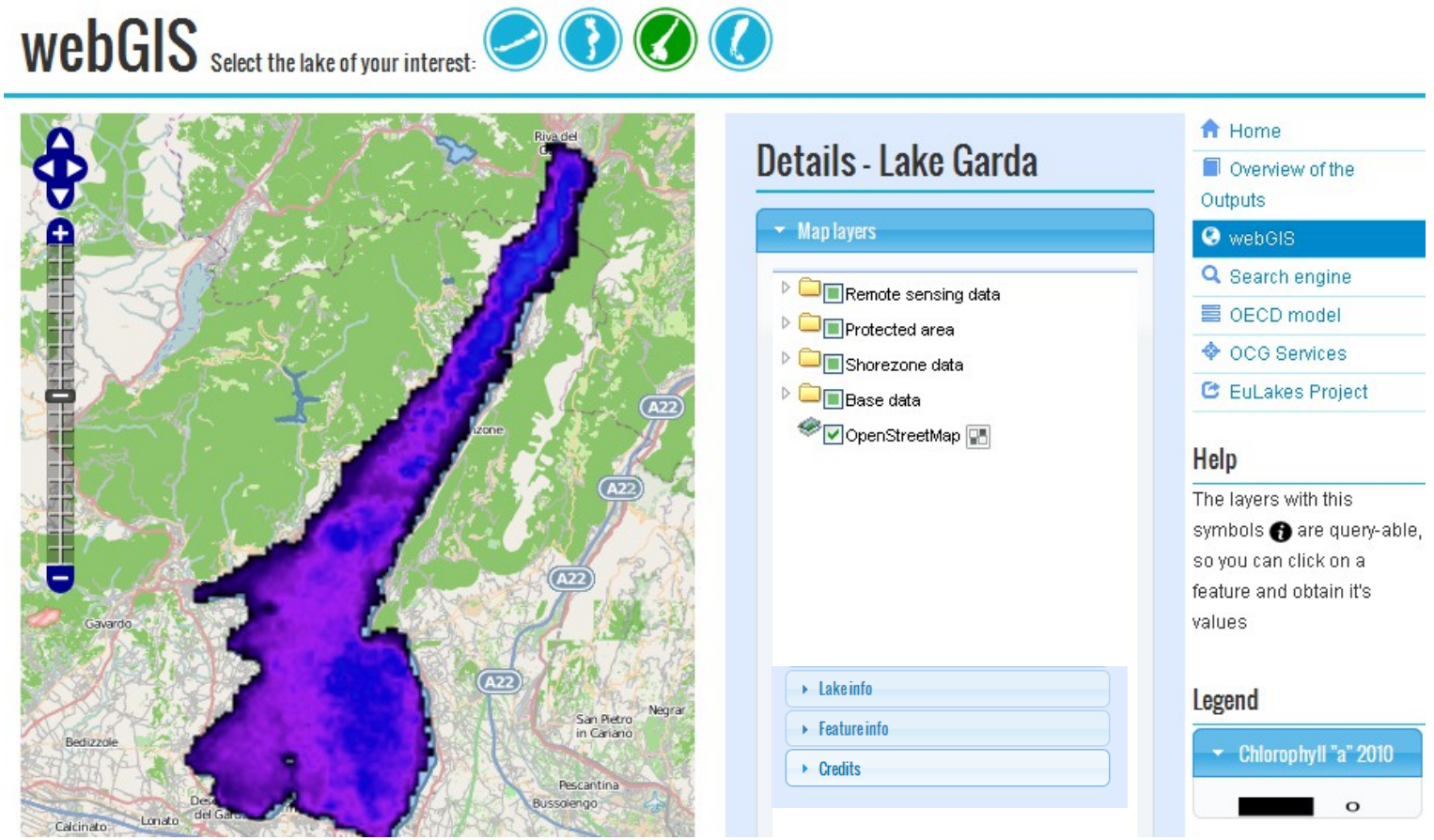
Lakes Management

- Lake skateholders
- Existing lake management plans and strategies

Search Engine

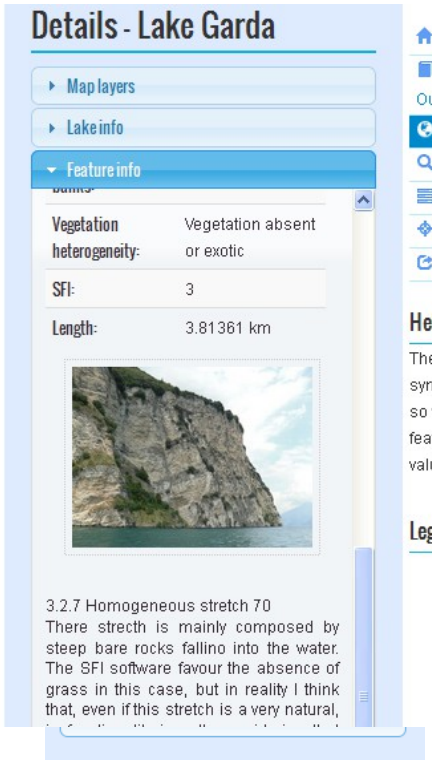


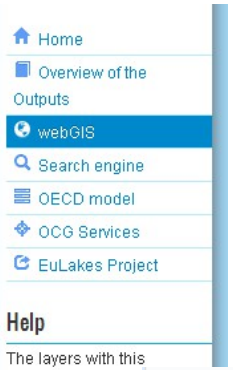
WebGIS

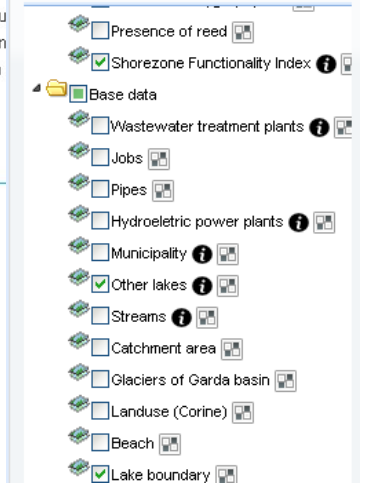


Georeferenced data: base cartography + Projects outputs + remote sensing data + climate change data

WebGIS





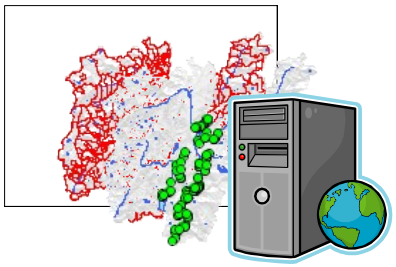


Layer Query

Feature Information:

- Reports broken down into small pieces (i.e SFI)

OCG Services: Introduction



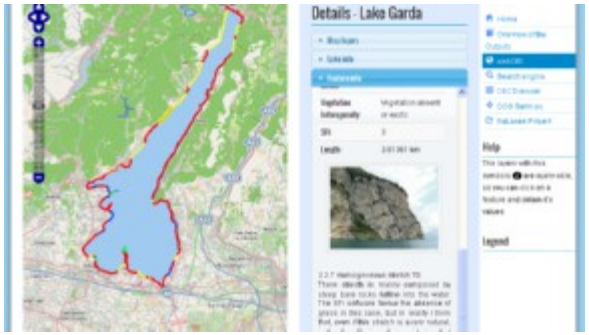
EULAKES Model
Geo database

Web Services

GIS Users

GIS Users

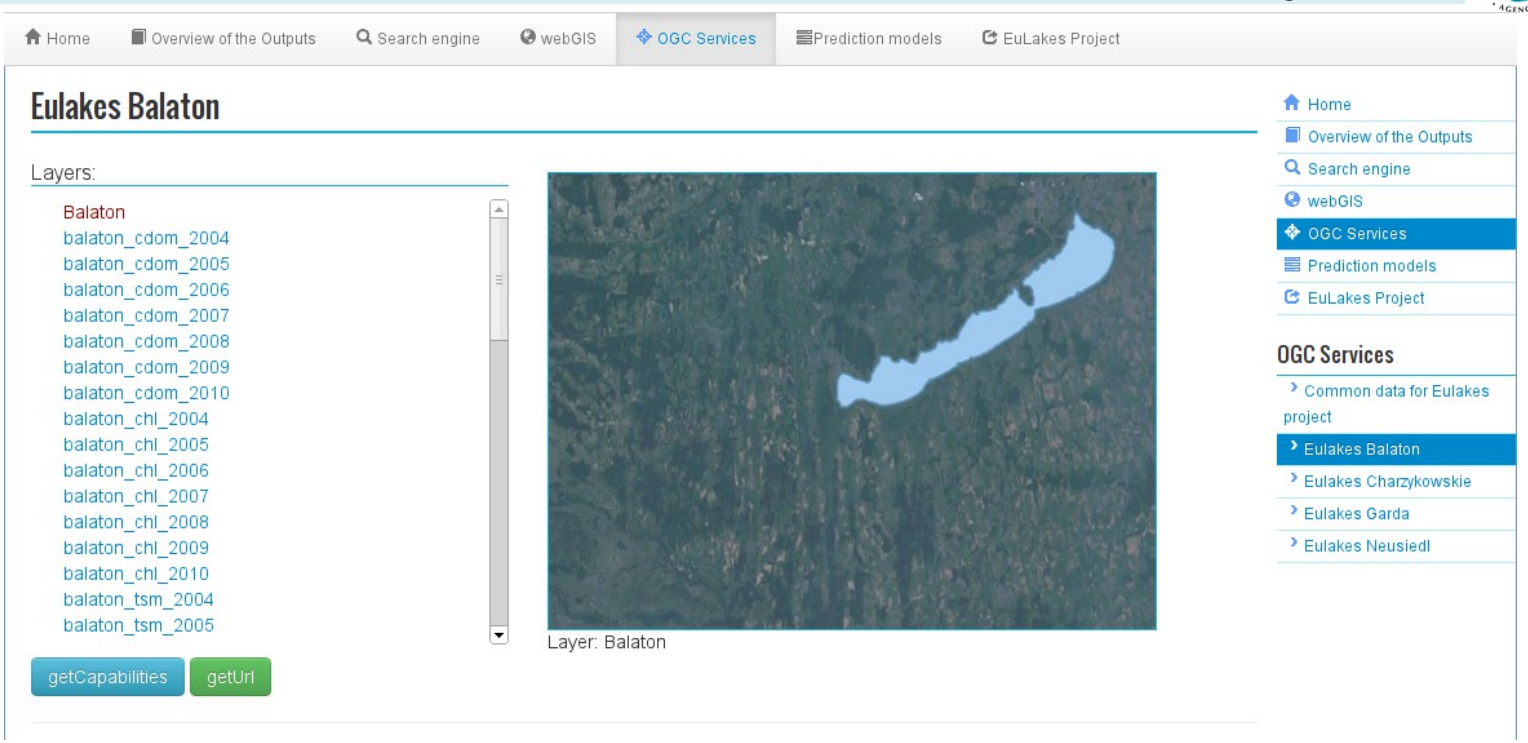
GIS Users



WebGIS Users

OGC Web Services for the standardization and interoperability of the geospatial data (Web Map Service)

OCG Services



Web Services for the standardization and interoperability of the geospatial data (Web Map Service)

- Preview of the layers
- “Get capabilities”: download directly the description of each lake service + future climate change scenairios
- “Url”: obtain the address where the service is stored

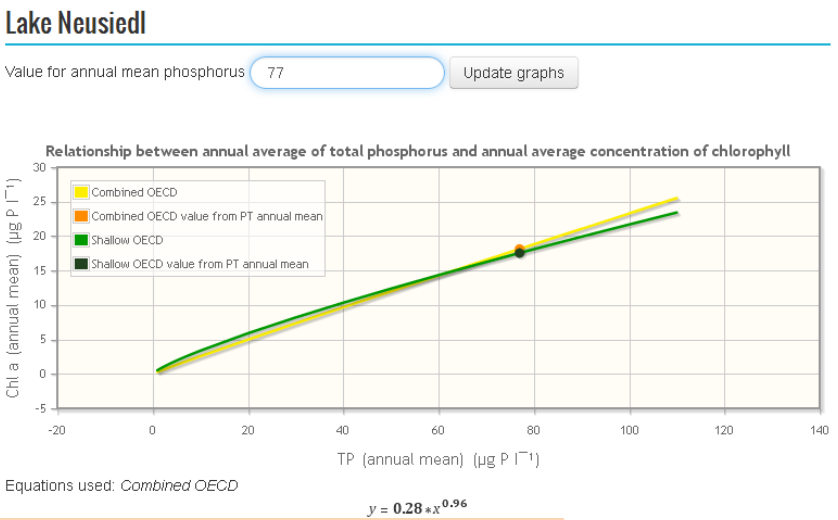
Model predictions: OECD

OECD Select the lake of your interest:

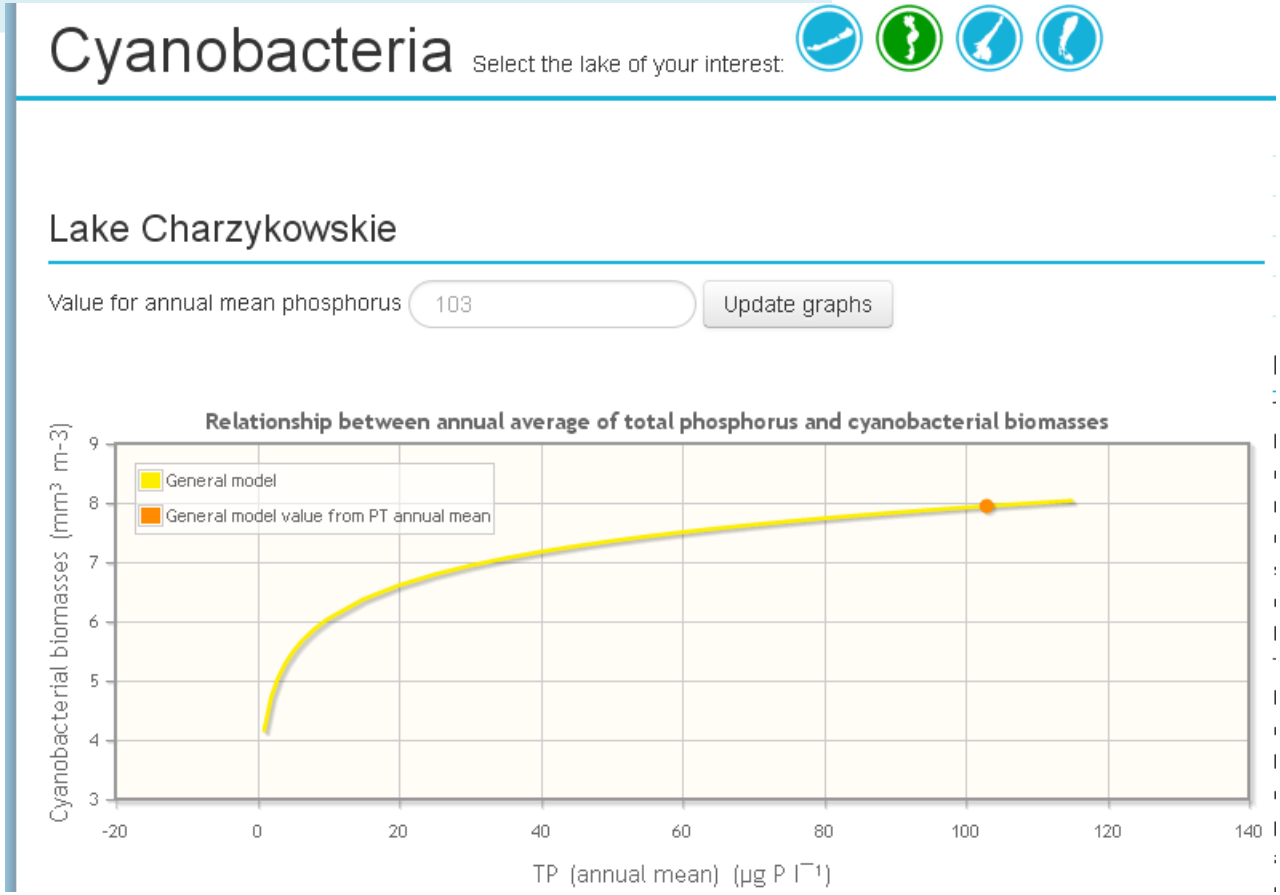
The lake could be

Ultra-oligotrophic	Phosphorus mean	chlorophyll mean	chlorophyll max	Secchi disk depth
Ultra-oligotrophic	<= 4.0	<= 1.0	<= 2.5	>= 12.0
Oligotrophic	<= 10.0	<= 2.5	<= 8.0	>= 6.0
Mesotrophic	**10.0-35.0**	**2.5-8.0**	**8.0-25.0**	**6.0-3.0**
Eutrophic	35-100	8.0-25.0	25.0-75.0	3.0-1.5
Hypetrophic	>= 100.0	>= 25.0	>= 75.0	<=1.5

- predict the interactions between chlorophyll, phosphorous and water transparency, based on the OECD equations

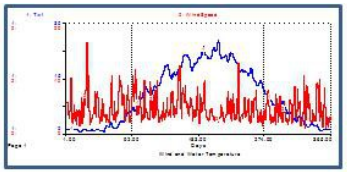


Model predictions: Cyanobacteria concentration



- predictcyanobactiera concentration in correlation with phosphorus and chlorophyll presence

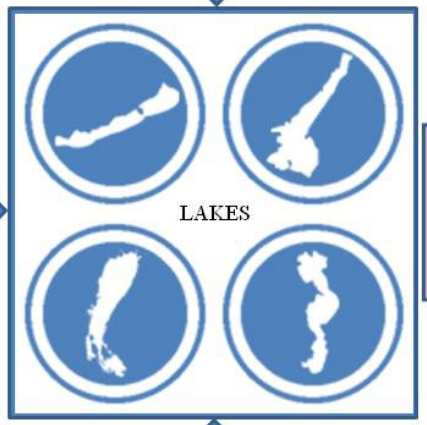
Model predictions: chlorophyll-a prediction model concept and input & output data types

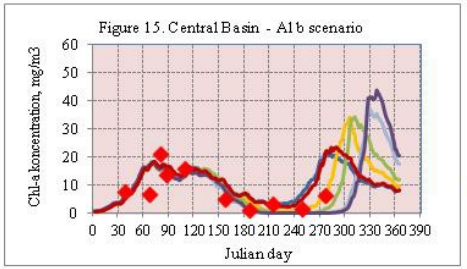


Air temperature, wind, solar radiation
(Time series)

Water Balance (Inflow, Precipitation, Evaporation, Outflow)

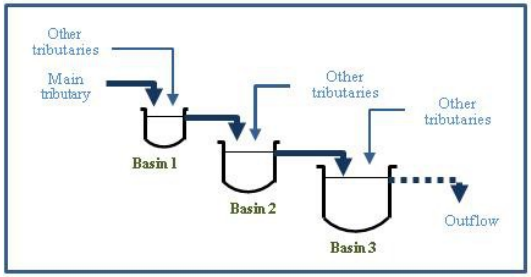
Influent nutrient concentrations
(Time series)





Water temperature, suspended sediment concentration, phosphorus , algae biomass & chlorophyll-a concentration
(Time series)

Physical model is different for each lake



Morphological parameters (number of sub-basins, depth, area, volume, stratification, location of inflows and outflow(s))
Biochemical and physical constants , parameters and functions
Sediment P content, initial values

EULAKES model results

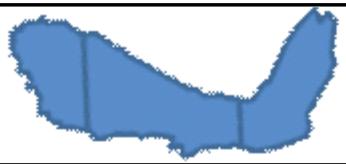
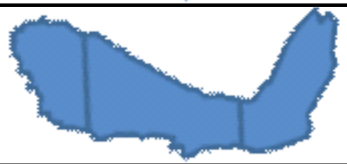
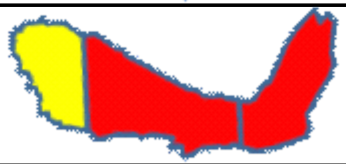
Change of summer maximum chlorophyll-a concentrations in the 4 basins of Lake Balaton as a function of climate change and nutrient load

Years (decades)	Climate Scenario A1b Phosphorus load reduction: 0 %	Climate Scenario A1b Phosphorus load reduction: 50 %
2011-2020		
2031-2040		
2051-2060		
2071-2080		
2091-2100		

Legend				
% of reference year (1994)	<100	100 - 140	140 - 180	>180

EULAKES model results

Change of annual average and annual maximum chlorophyll-a concentrations in the 3 basins of Lake Neusiedl as a function of climate change

Years (decades)	Climate Scenario A1b Annual average	Climate Scenario A1b Annual maximum
2011-2020		
2031-2040		
2051-2060		
2071-2080		
2091-2100		

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Internet Address of the EULAKES Model Web site:

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